

## CESM1\_2\_0 学习笔记

用户手册

<http://www.cesm.ucar.edu/models/cesm1.2/cesm/doc/usersguide/book1.html>

### 一、 模式下载

(1) `>svn list https://svn-ccsm-release.cgd.ucar.edu/model_versions`  
(查询版本)

(2) `>svn co`

`https://svn-ccsm-models.cgd.ucar.edu/cesm1/release_tags/cesm1_2_1`  
`cesm1_2_1`

(下载 cesm1\_2\_1, 用户名: guesteser 密码: friendly)

`>svn co https://svn-ccsm-release.cgd.ucar.edu/model_versions/cesm1_2_0`

`cesm1_2_0`

(下载 cesm1\_2\_0 用户名: guesteser 密码: friendly)

(3) `> scp -r cesm1_2_0 tianhy@219.246.67.132:/gpfs/home/tianhy/lixt`  
(拷贝至 tianhy/lixt)

### 二、 模式移植 (cesm1\_2\_0)

进入 `> cd cesm1_2_0/scripts/ccsm_utils/Machines` 修改模式参数

(1) `>vim config_machines.xml`

```
[tian@ln01 example2-CESM]$ vim config_machines.xml
<machine MACH="ibmintel">
  <DESC>IBM</DESC>
  <OS>LINUX</OS>
  <COMPILERS>intel</COMPILERS>
  <MPILIBS>impi</MPILIBS>
  <RUNDIR>/gpfsdata/tianws/zhangjk/model/cesm1_2_0/cases/$CASE/run</RUNDIR>
  <EXEROOT>/gpfsdata/tianws/zhangjk/model/cesm1_2_0/cases/$CASE</EXEROOT>
  <DIN_LOC_ROOT>/gpfs/home/tian/model/CESM/inputdata</DIN_LOC_ROOT>
  <DIN_LOC_ROOT_CLMFORC>/gpfs/home/tian/model/CESM/inputdata/atm/datm7</DIN_LOC_ROOT_CLMFORC>
  <DOUT_S_ROOT>/gpfsdata/tian/zhangjk/cesm1_2_0/archive/$CASE</DOUT_S_ROOT>
  <DOUT_L_MSROOT>cesm/$CASE</DOUT_L_MSROOT>
  <CCSM_BASELINE>/work/02463/srinathv/ccsm_baselines</CCSM_BASELINE>
  <CCSM_CPRNC>/work/02463/srinathv/tools/cprnc/cprnc</CCSM_CPRNC>
  <BATCHQUERY>queue</BATCHQUERY>
  <BATCHSUBMIT>sbatch</BATCHSUBMIT>
  <SUPPORTED_BY>srinathv -at- ucar.edu</SUPPORTED_BY>
  <GMAKE_J>8</GMAKE_J>
  <MAX_TASKS_PER_NODE>64</MAX_TASKS_PER_NODE>
  <PES_PER_NODE>32</PES_PER_NODE>
</machine>
```

MACH 即你给机器取的名字

OS 一般写 LINUX

GMAKE\_J 为你编译时候调用的核心数, 一般写少一点就行, 建议写个 1 或 2

MAX\_TASKS\_PER\_NODE <=每个节点的核心数目

```
[tian@ln01 Machines]$ vim config_machines.xml

<MPILIBS>impi</MPILIBS>
<RUNDIR>/gpfsdata/tianw/lixt/cesm1_2_0/cases/$CASE/run</RUNDIR>
<EXERROOT>/gpfsdata/tianws/lixt/cesm1_2_0/cases/$CASE</EXERROOT>
<DIN_LOC_ROOT>/gpfshome/tian/model/CESM/inputdata</DIN_LOC_ROOT>
<DIN_LOC_ROOT_CLMFORC>/gpfshome/tian/model/CESM/inputdata/atm/datm7</DIN_LOC_ROOT_CLMFORC>
<DOUT_S_ROOT>/gpfsdata/tianws/lixt/cesm1_2_0/archive/$CASE</DOUT_S_ROOT>
<DOUT_L_MSROOT>esm/$CASE</DOUT_L_MSROOT>
<CCSM_BASELINE>/work/02463/srinathv/ccsm_baselines</CCSM_BASELINE>
<CCSM_CPRNC>/work/02463/srinathv/tools/cprnc/cprnc</CCSM_CPRNC>
<BATCHQUERY>squeue</BATCHQUERY>
<BATCHSUBMIT>sbatch</BATCHSUBMIT>
<SUPPORTED_BY>srinathv -at- ucar.edu</SUPPORTED_BY>
<GMAKE_J>8</GMAKE_J>
<MAX_TASKS_PER_NODE>64</MAX_TASKS_PER_NODE>
<PES_PER_NODE>32</PES_PER_NODE>
</machine>
```

(可进入 tian 账号中/gpfsdata/tianws/zhangjk/model/example2-CESM 中复制)

(2) >vim Makefile (zai 60%)

```
# System libraries (netcdf, mpi, pnetcdf, esmf, trilinos, etc.)
ifndef SLIBS
    SLIBS := -L$(LIB_NETCDF) -lnetcdf -lnetcdfi
endif
ifdef LIB_PNETCDF
```

注意是-lnetcdfi

(3) >cp mkbatch.userdefined mkbatch.ibmintel

(4) >cp env\_mach\_specific.userdefined env\_mach\_specific.ibmintel  
>vim env\_mach\_specific.ibmintel

```
#source /opt/modules/default/init/csh
#if ( $COMPILER == "pgi" ) then
# module load pgi
#endif
#module load netcdf

setenv NETCDF_PATH /gpfshome/tian/tools/netcdf-intel2013/
#limit coredumpsize unlimited
```

(5) >vim config\_compilers.xml

(27%)

```
<compiler COMPILER="intel">
  <!-- http://software.intel.com/en-us/articles/intel-composer-xe/ -->
  <ADD_CPPDEFS> -DFORTRANUNDERSCORE -DNO_R16</ADD_CPPDEFS>
  <ADD_CFLAGS compile_threaded="true"> -openmp </ADD_CFLAGS>
  <ADD_FFLAGS compile_threaded="true"> -openmp </ADD_FFLAGS>
  <ADD_LDFLAGS compile_threaded="true"> -openmp </ADD_LDFLAGS>
  <FREEFLAGS> -free </FREEFLAGS>
  <FIXEDFLAGS> -fixed -132 </FIXEDFLAGS>
  <ADD_FFLAGS DEBUG="TRUE"> -g -CU -check pointers -fpe0 </ADD_FFLAGS>
  <FFLAGS> -O2 -fp-model source -convert big_endian -assume byterecl -ftz -traceback </FFLAGS>
  <CFLAGS> -O2 -fp-model precise </CFLAGS>
  <FFLAGS_NOOPT> -O0 </FFLAGS_NOOPT>
  <FC_AUTO_R8> -r8 </FC_AUTO_R8>
  <SFC> ifort </SFC>
  <SCC> icc </SCC>
  <SCXX> icpc </SCXX>
  <MPIFC> mpiifort </MPIFC>
  <MPICC> mpiicc </MPICC>
  <MPICXX> mpiicpc </MPICXX>
  <CXX_LINKER>FORTRAN</CXX_LINKER>
  <CXX_LDFLAGS> -cxxlib </CXX_LDFLAGS>
  <SUPPORTS_CXX>TRUE</SUPPORTS_CXX>
</compiler>
```

### 三、 调试


basic example

[http://www.cesm.ucar.edu/models/cesm1.2/cesm/doc/usersguide/c1868.html#use\\_case\\_basic](http://www.cesm.ucar.edu/models/cesm1.2/cesm/doc/usersguide/c1868.html#use_case_basic)

进入 cesm1\_2\_0/scripts 目录下设计实验

(1)>cd cesm1\_2\_0/scripts

(2)>./create\_newcase -case control -res f19\_g16 -compset F\_1955-2005\_WACCM\_CN -mach ibmintel

```
[tian@ln01 scripts]$ ./create_newcase -case control -res f19_g16 -compset F_1955-2005_WACCM_CN -mach ibmintel
-----
For a list of potential issues in the current tag, please point your web browser to:
https://svn-cesm-models.cgd.ucar.edu/cesm1/known_problems/
-----
grid longname is f19_g16
Component set: longname (shortname) (alias)
  5505_CAM4%WCCM_CLM40%CN_CICE%PRES_DOCN%DOM_RTM_SGLC_SWAV (F_1955-2005_WACCM_CN) (F55WCN)
Component set Description:
  CAM: CLM: RTM: CICE: DOCN: SGLC: SWAV: 1955 to 2005 transient: cam4 physics: CAM WACCM with daily solar data and SPE
  s: clm4.0 physics: clm4.0 cn: prescribed cice: docn data mode:

```

```
The PE layout for this case match these options:
GRID = a%1.9x2.5
Creating /gpfsdata/tianws/lixt/cesm1_2_0/scripts/control
Created /gpfsdata/tianws/lixt/cesm1_2_0/scripts/control/env_case.xml
Created /gpfsdata/tianws/lixt/cesm1_2_0/scripts/control/env_mach_pes.xml
Created /gpfsdata/tianws/lixt/cesm1_2_0/scripts/control/env_build.xml
Created /gpfsdata/tianws/lixt/cesm1_2_0/scripts/control/env_run.xml
Locking file /gpfsdata/tianws/lixt/cesm1_2_0/scripts/control/env_case.xml
Successfully created the case for ibmintel
[tian@ln01 scripts]$ cd control/
```

(3)>cd scripts/control

>./cesm\_setup

```

[tian@ln01 control]$ ./cesm_setup
Creating Macros file for ibmintel
/gpfsdata/tianws/lixt/cesm1_2_0/scripts/ccsm_utils/Machines/config_compilers.xml intel ibmintel
Creating batch script control.run
Locking file env_mach_pes.xml
Creating user_nl_xxx files for components and cpl
Running preview_namelist script
infile is /gpfsdata/tianws/lixt/cesm1_2_0/scripts/control/Buildconf/cplconf/cesm_namelist
CAM writing dry deposition namelist to drv_flds_in
Writing ocean component namelist to ./docn_in
CAM writing namelist to atm_in
CLM configure done.
CLM adding use_case 1850-2100_rcp4.5_transient defaults for var clm_demand with val fpftdyn
CLM adding use_case 1850-2100_rcp4.5_transient defaults for var clm_start_type with val arb_ic
CLM adding use_case 1850-2100_rcp4.5_transient defaults for var model_year_align_ndep with val 1850
CLM adding use_case 1850-2100_rcp4.5_transient defaults for var rcp with val 4.5
CLM adding use_case 1850-2100_rcp4.5_transient defaults for var sim_year with val 1850
CLM adding use_case 1850-2100_rcp4.5_transient defaults for var sim_year_range with val 1850-2100
CLM adding use_case 1850-2100_rcp4.5_transient defaults for var stream_year_first_ndep with val 1850
CLM adding use_case 1850-2100_rcp4.5_transient defaults for var stream_year_last_ndep with val 2100
CLM adding use_case 1850-2100_rcp4.5_transient defaults for var use_case_desc with val Simulate transient land-use, ae
rosol and Nitrogen deposition changes with historical data from 1850 to 2005 and then with the RCP4.5 scenario from MI
NICAM

```

## >./control.build

```

ICE configure done.
See ./CaseDoc for component namelists
If an old case build already exists, might want to run control.clean_build before building
[tian@ln01 control]$ ./control.build
-----
CESM BUILDNML SCRIPT STARTING
- To prestage restarts, untar a restart.tar file into /gpfsdata/tianw/lixt/cesm1_2_0/cases/control/run
infile is /gpfsdata/tianws/lixt/cesm1_2_0/scripts/control/Buildconf/cplconf/cesm_namelist
CAM writing dry deposition namelist to drv_flds_in
Writing ocean component namelist to ./docn_in
CAM writing namelist to atm_in
CLM configure done.
CLM adding use_case 1850-2100_rcp4.5_transient defaults for var clm_demand with val fpftdyn
CLM adding use_case 1850-2100_rcp4.5_transient defaults for var clm_start_type with val arb_ic
CLM adding use_case 1850-2100_rcp4.5_transient defaults for var model_year_align_ndep with val 1850
CLM adding use_case 1850-2100_rcp4.5_transient defaults for var rcp with val 4.5
CLM adding use_case 1850-2100_rcp4.5_transient defaults for var sim_year with val 1850
CLM adding use_case 1850-2100_rcp4.5_transient defaults for var sim_year_range with val 1850-2100
CLM adding use_case 1850-2100_rcp4.5_transient defaults for var stream_year_first_ndep with val 1850
CLM adding use_case 1850-2100_rcp4.5_transient defaults for var stream_year_last_ndep with val 2100
CLM adding use_case 1850-2100_rcp4.5_transient defaults for var use_case_desc with val Simulate transient land-use, ae
rosol and Nitrogen deposition changes with historical data from 1850 to 2005 and then with the RCP4.5 scenario from MI
NICAM

```

```

- Case input data directory, DIN_LOC_ROOT, is /gpfs/home/tian/model/CESM/inputdata
- Checking the existence of input datasets in DIN_LOC_ROOT

The following files were not found, this is informational only
Input Data List Files Found:
/gpfsdata/tianws/lixt/cesm1_2_0/scripts/control/Buildconf/cpl.input_data_list
/gpfsdata/tianws/lixt/cesm1_2_0/scripts/control/Buildconf/cam.input_data_list
/gpfsdata/tianws/lixt/cesm1_2_0/scripts/control/Buildconf/clm.input_data_list
/gpfsdata/tianws/lixt/cesm1_2_0/scripts/control/Buildconf/cice.input_data_list
/gpfsdata/tianws/lixt/cesm1_2_0/scripts/control/Buildconf/docn.input_data_list
/gpfsdata/tianws/lixt/cesm1_2_0/scripts/control/Buildconf/rtm.input_data_list
File status unknown: b40.20th.track1.2deg.wcm.007.cam.i.1955-01-01-00000.nc
File status unknown: b40.20th.track1.2deg.wcm.007.clm2.r.1955-01-01-00000.nc
File status unknown: b40.20th.track1.2deg.wcm.007.clm2.r.1955-01-01-00000.nc

```

```

- Prestaging REFCASE (ccsm4_init/b40.20th.track1.2deg.wcm.007/1955-01-01) to /gpfsdata/tianw/lixt/cesm1_2_0/cases/control/run
CESM PRESTAGE SCRIPT HAS FINISHED SUCCESSFULLY
-----

```

```

CESM BUILDDEXE SCRIPT STARTING
COMPILER is intel
- Build Libraries: mct gptl pio csm_share
Tue Dec 8 10:58:03 CST 2015 /gpfsdata/tianws/lixt/cesm1_2_0/cases/control/mct/mct.bldlog.151208-105751
Tue Dec 8 10:58:47 CST 2015 /gpfsdata/tianws/lixt/cesm1_2_0/cases/control/gptl/gptl.bldlog.151208-105751

```

```

CESM BUILDDEXE SCRIPT STARTING
COMPILER is intel
- Build Libraries: mct gptl pio csm_share
Tue Dec 8 10:58:03 CST 2015 /gpfsdata/tianws/lixt/cesm1_2_0/cases/control/mct/mct.bldlog.151208-105751
Tue Dec 8 10:58:47 CST 2015 /gpfsdata/tianws/lixt/cesm1_2_0/cases/control/gptl/gptl.bldlog.151208-105751
Tue Dec 8 10:58:50 CST 2015 /gpfsdata/tianws/lixt/cesm1_2_0/cases/control/pio/pio.bldlog.151208-105751
Tue Dec 8 10:59:42 CST 2015 /gpfsdata/tianws/lixt/cesm1_2_0/cases/control/csm_share/csm_share.bldlog.151208-105751
Tue Dec 8 11:00:02 CST 2015 /gpfsdata/tianws/lixt/cesm1_2_0/cases/control/atm/atm.bldlog.151208-105751
Tue Dec 8 11:02:24 CST 2015 /gpfsdata/tianws/lixt/cesm1_2_0/cases/control/lnd/lnd.bldlog.151208-105751
Tue Dec 8 11:04:50 CST 2015 /gpfsdata/tianws/lixt/cesm1_2_0/cases/control/ice/ice.bldlog.151208-105751
Tue Dec 8 11:06:30 CST 2015 /gpfsdata/tianws/lixt/cesm1_2_0/cases/control/ocn/ocn.bldlog.151208-105751
Tue Dec 8 11:06:32 CST 2015 /gpfsdata/tianws/lixt/cesm1_2_0/cases/control/glc/glc.bldlog.151208-105751
Tue Dec 8 11:06:33 CST 2015 /gpfsdata/tianws/lixt/cesm1_2_0/cases/control/wav/wav.bldlog.151208-105751
Tue Dec 8 11:06:33 CST 2015 /gpfsdata/tianws/lixt/cesm1_2_0/cases/control/rof/rof.bldlog.151208-105751
Tue Dec 8 11:06:44 CST 2015 /gpfsdata/tianws/lixt/cesm1_2_0/cases/control/cesm.bldlog.151208-105751
- Locking file env_build.xml
CESM BUILDDEXE SCRIPT HAS FINISHED SUCCESSFULLY
-----

```

```

[tian@ln01 control]$

```

(下载数据需到自己服务器目录下进行以上操作, 再将数据上传至 tianhy 用类似 `scp -r cesm1_2_1 tianhy@219.246.67.132:/gpfshome/tianhy/lixt` 方式上传)

Ps:院里服务器已有此数据, 只要将 `config_machines.xml` 中数据路径设置为 `/gpfshome/tianhy/model/CESM/inputdata` 即可。

#### (4) 提交试验

进入 `cesm1_2_0/cases/control/run: bsub < sub.lsf`

(`control` 为可替换的试验名, 如果试验名称取成其他名字, 后面相应的文件名也要替换)

```
>cd cesm1_2_0/cases/ control
```

```
>cp sub.lsf ./control/run
```

(以上操作可通过文件传输方式将 `sub.lsf` 文件上传至 `cesm1_2_0/cases/control/run` 中实现)

```
>vim drv_in(修改时间)
```

```
>bsub < sub.lsf(提交作业)
```

```
[tianhy@ln01 run]$ bsub <sub.lsf
Job <280134> is submitted to queue <blade>.
```

```
>bjobs(查看工作目录)
```

JOBID	USER	STAT	QUEUE	FROM_HOST	EXEC_HOST	JOB_NAME	SUBMIT_TIME
279834	tian	RUN	blade	ln01	32*c0312 32*c0107	sst6_li	Dec 2 18:01
279917	tian	RUN	blade	ln01	32*c0114 27*c0304 5*c0102	sst5_li	Dec 3 19:46
280176	tian	RUN	blade	ln01	29*c0105 32*c0308 3*c0207	control	Dec 8 11:19
280177	tian	RUN	blade	ln01	29*c0207 32*c0104 3*c0309	control	Dec 8 11:29

```
>bpeek 280177(查看进展)
```

#### (5)output data

Eg: `control.cam.h0.1955-01.nc`

文件名形式: `$(CASE).$(scomp).$(type).[$string.]$(date[$ending])`

其中 `$(scomp)` = (cam2,clm2,pop,cice,glc,cpl,datm,dice,dInd,docn)

`$(type)` = (h\*,r\*,i\*,d\*) 【h (history), r (restart), i (initial), or d (diagnostic), rs (cam surface restart), rh (restart history), and rd (restart diagnostic)】

`$(date)` = (yyyy-mm-dd-sssss, yyyy-mm-dd, yyyy-mm, yyyy)

#### 四、各参数含义

### (1) `.create_newcase` \ 选项

-case case-name \  
-compset component-set \  
-res resolution \  
-mach machine-name \  
[-compiler compiler-name] \  
[-mpilib mpi-library-name] \  
[-mach\_dir alternative pathname for Machines directory] \  
[-confopts [\_AOA],[AOE],[\_D],[\_E],[\_N],[\_P],[\_R]] \  
[-pecount [S,M,L,X1,X2]] \  
[-pes\_file full-pathname] \  
[-user\_compset new user compset long name] \  
[-user\_grid\_file full-pathname of user xml grid file] \  
[-help [or -h]] |  
[-list [compsets,grids,machines] \\  
[-silent [or -s]] \  
[-verbose [or -v]] \  
[-xmlmode [normal, expert]] \  
[-nowarning]

### (2) `.-res f19_g16`

表示 1.9x2.5 分辨率

全称: a%1.9x2.5\_l%1.9x2.5\_oi%gx1v6\_r%r05\_m%gx1v6\_g%null\_w%null

形式: a%name\_l%name\_oi%name\_r%name\_m%mask\_g%name\_w%name

a% = atmosphere grid

l% = land grid

oi% = ocean/sea-ice grid (must be the same)

r% = river grid

m% = land mask grid

g% = internal land-ice (CISM) grid

w% = wave component grid (not relevant in CESM1.2 series)

命名规则如下:

"[dlat]x[dlon]" are regular lon/lat finite volume grids where dlat and dlon are the approximate grid spacing. The shorthand convention is "fnn" where nn is generally a pair of numbers indicating the resolution. An example is 1.9x2.5 or f19 for the approximately "2-degree" finite volume grid. Note that CAM uses an [nlat]x[nlon] naming convention internally for this grid.

"Tnn" are spectral lon/lat grids where nn is the spectral truncation value for the resolution. The shorthand name is identical. An example is T85.

"ne[X]np[Y]" are cubed sphere resolutions where X and Y are integers. The short name is generally ne[X]. An example is ne30np4 or ne30."pt1" is a single grid point.

"gx[D]v[n]" is a displaced pole grid where D is the approximate resolution in degrees and n is the grid version. The short name is generally g[D][n]. An example is gx1v6 or g16 for a grid of approximately 1-degree resolution.

"tx[D]v[n]" is a tripole grid where D is the approximate resolution in degrees and n is the grid version.

所有支持的格点列表:

<http://www.cesm.ucar.edu/models/cesm1.2/cesm/doc/modelnl/grid.html>

### (3) `.-compset F_1955-2005_WACCM_CN`

全称:

形式:

TIME\_ATM[%phys]\_LND[%phys]\_ICE[%phys]\_OCN[%phys]\_ROF[%phys]\_GLC[%phys]  
\_WAV[%phys][\_BGC%phys]

TIME = model time period (e.g. 2000, 20TR, RCP8...)

ATM = [CAM4, CAM5, DATM, SATM, XATM]

LND = [CLM40, CLM45, DLND, SLND, XLND]

ICE = [CICE, DICE, SICE, SICE]

OCN = [POP2, DOCN, SOCN, XOCN, AQUAP]

ROF = [RTM, DROF, SROF, XROF]

GLC = [CISM1, SGLC, XGLC]

WAV = [SWAV, XWAV]

BGC = optional BGC scenario

所有实验配置列表:

<http://www.cesm.ucar.edu/models/cesm1.2/cesm/doc/modelnl/compsets.html>

### (4) `.-mach ibmintel`(机器类型)

## 五、一些链接

Namelist

<http://www.cesm.ucar.edu/models/cesm1.1/cesm/doc/modelnl/>

控制 CAM 输出内容

<http://www.cesm.ucar.edu/models/cesm1.2/cesm/doc/usersguide/x2172.html>

温室气体强迫 CAM: How do I customize CAM forcings

<http://www.cesm.ucar.edu/models/cesm1.2/cesm/doc/usersguide/x2241.html>

CAM/CLM: How do I change history file output frequency and content for CAM and CLM during a run?

<http://www.cesm.ucar.edu/models/cesm1.2/cesm/doc/usersguide/x2268.html>

User-created input data

<http://www.cesm.ucar.edu/models/cesm1.2/cesm/doc/usersguide/x1045.html>

Batch jobs

⇒ bsub

To submit a batch job, use the command **bsub** with the redirect sign (<) and the name of your batch script file.

```
bsub < script_name
```

We recommend passing the options to bsub in a batch script file rather than with numerous individual commands.

Include these options in your script:

- -J job\_name
- -P project\_code
- -R with "span[ptile=n]" for tasks per node
- -W [hour:]minute
- -e error\_file\_name
- -o output\_file\_name
- -n number of tasks
- -q queue\_name
- -w dependency\_expression (if applicable)
- -B (if you want to receive an email when the job starts)
- -N (if you want to receive the job report by email when the job finishes)

Use the same name for your output and error files if you want the data stored in a



env.rar